

*REINFORCEMENT OF COMPLIANCE WITH  
RESPIRATORY TREATMENT IN A CHILD WITH  
CYSTIC FIBROSIS*

LOUIS P. HAGOPIAN AND RACHEL H. THOMPSON

KENNEDY KRIEGER INSTITUTE AND  
JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

An 8-year-old boy with cystic fibrosis (CF), mental retardation, and autism exhibited noncompliance with respiratory treatments that were essential for the management of his CF. A treatment involving shaping cooperation while still allowing escape for aggression and avoidance behavior resulted in increases compliance with respiratory treatments and decreases in problem behavior. Treatment gains were maintained over 3 months.

DESCRIPTORS: noncompliance, behavioral pediatrics, shaping

Many individuals with developmental disabilities suffer from chronic illnesses that necessitate their participation in medical procedures that produce discomfort. Noncompliance with these procedures may result in increased medical complications, and in some cases, premature death. The results of several recent studies have indicated that reinforcement-based interventions can be effective in increasing compliance with medical procedures among individuals with mental retardation (Amari, Grace, & Fisher, 1995; McComas, Wacker, & Cooper, 1998). In the current investigation, we report on a child with cystic fibrosis (CF) and mental retardation who displayed noncompliance with his respiratory treatments. We developed a treatment that involved shaping compliance without escape extinction for aggression and avoidance behavior.

#### METHOD

Cal was an 8-year-old boy who had been diagnosed with CF, autism, and severe men-

tal retardation. He was admitted to an inpatient behavioral unit for the treatment of destructive behavior (i.e., hitting, biting, property destruction). Noncompliance with his prescribed respiratory treatments (essential for management of his CF) was also reported. Results of a functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) indicated that his destructive behaviors were maintained by escape from dressing and hygiene tasks as well as by access to adult attention. Data on the treatment of destructive behavior are not presented here because the focus of this study was Cal's compliance with respiratory treatments.

An aerosol inhaler (Inspirease Drug Delivery System, 460-202) with a one-way detachable chamber was used in all sessions. The chamber allowed Cal to inhale the medication by breathing normally, with the mask to his face, for approximately 20 s. His recommended respiratory therapy regimen included two consecutive 20-s inhalations delivered three times per day.

Data were collected on the occurrence of aggression (hitting, scratching, or kicking the therapist) and avoidance behavior (pushing the mask or the therapist away, or moving his head away from the mask) and the duration of compliance. Compliance was de-

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This investigation was supported in part by Grant MCJ249149-02 from the Maternal and Child Health Service of the U.S. Department of Health and Human Services.

Requests for reprints should be addressed to Louis Hagopian, Department of Behavioral Psychology, The Kennedy Krieger Institute, 707 North Broadway, Baltimore, Maryland 21205.

finer as Cal allowing the mask to be held to his face for a prespecified duration without exhibiting any aggression or avoidance behavior. Reliability data were collected by an independent observer during 44% of the sessions. Interobserver agreement for aggression and avoidance behavior was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Trials with agreement were those in which both observers indicated that aggression or avoidance occurred, or agreed that these behaviors did not occur. Interobserver agreement for the duration of compliance was calculated by dividing the smaller recorded duration by the larger recorded duration. Interobserver agreement was 100% for aggression and avoidance behavior and 99% for compliance. During follow-up, caregivers continued to present trials until Cal was compliant with two 20-s administrations. Caregivers recorded the number of trials attempted before Cal was compliant with two administrations (no reliability data were collected during follow-up). Percentage compliance during follow-up was calculated by dividing the number of trials with compliance by the total number of trials attempted.

Initially, sessions were conducted in a treatment room 3 m by 3 m). Later, sessions were conducted in a variety of settings. All sessions during the assessment consisted of two consecutive trials. In the baseline condition, the therapist attempted to hold the inhaler mask to Cal's face for 20 s on each trial (no mist was released into the chamber). Social praise was provided for compliance. If Cal displayed any aggression or avoidance behavior, the mask was immediately removed from his face and the trial was terminated. Each trial was followed by a 1-min period during which Cal was required to stay in the session area. No attention or materials were available during the 1-min intertrial interval.

During treatment, praise and preferred items were presented contingent on compliance during the 1-min intertrial interval. Items were selected based on the results of a preference assessment (Fisher et al., 1992) and included candy, matchbox cars, and play school figures. Compliance resulted in access to all three preferred items for 1 min. As in baseline, aggression or avoidance behavior resulted in termination of the trial. A shaping procedure was used in which the duration of compliance required to obtain reinforcement was gradually increased. The criterion was initially 5 s and was increased in 5-s increments until it reached 20 s. An ABAB design was used to demonstrate functional control. Later, a placebo mist was added and released into the chamber when the mask was placed to Cal's face. The procedure was then extended to a variety of settings (medical treatment room, Cal's bedroom, and the living area) and with several therapists (nurses, direct care staff, and parents). The placebo mist was then replaced with the medication (Cromolyn). Finally, the reinforcement interval was decreased from 1 min to 30 s.

## RESULTS AND DISCUSSION

Cal required two 20-s inhalation treatments for each administration of his medication. Therefore, the target duration of compliance was 40 s. During the initial baseline phase, the mean duration of compliance was 13.8 s (Figure 1, top panel). The treatment package, consisting of shaping and reinforcement for compliance, resulted in increases in compliance and decreases in aggression and avoidance behavior (Figure 1, bottom panel). The amount of time Cal was required to be compliant in order to obtain reinforcement was increased from 5 s to 20 s between Sessions 6 and 24 and remained at 20 s for all subsequent sessions. In the

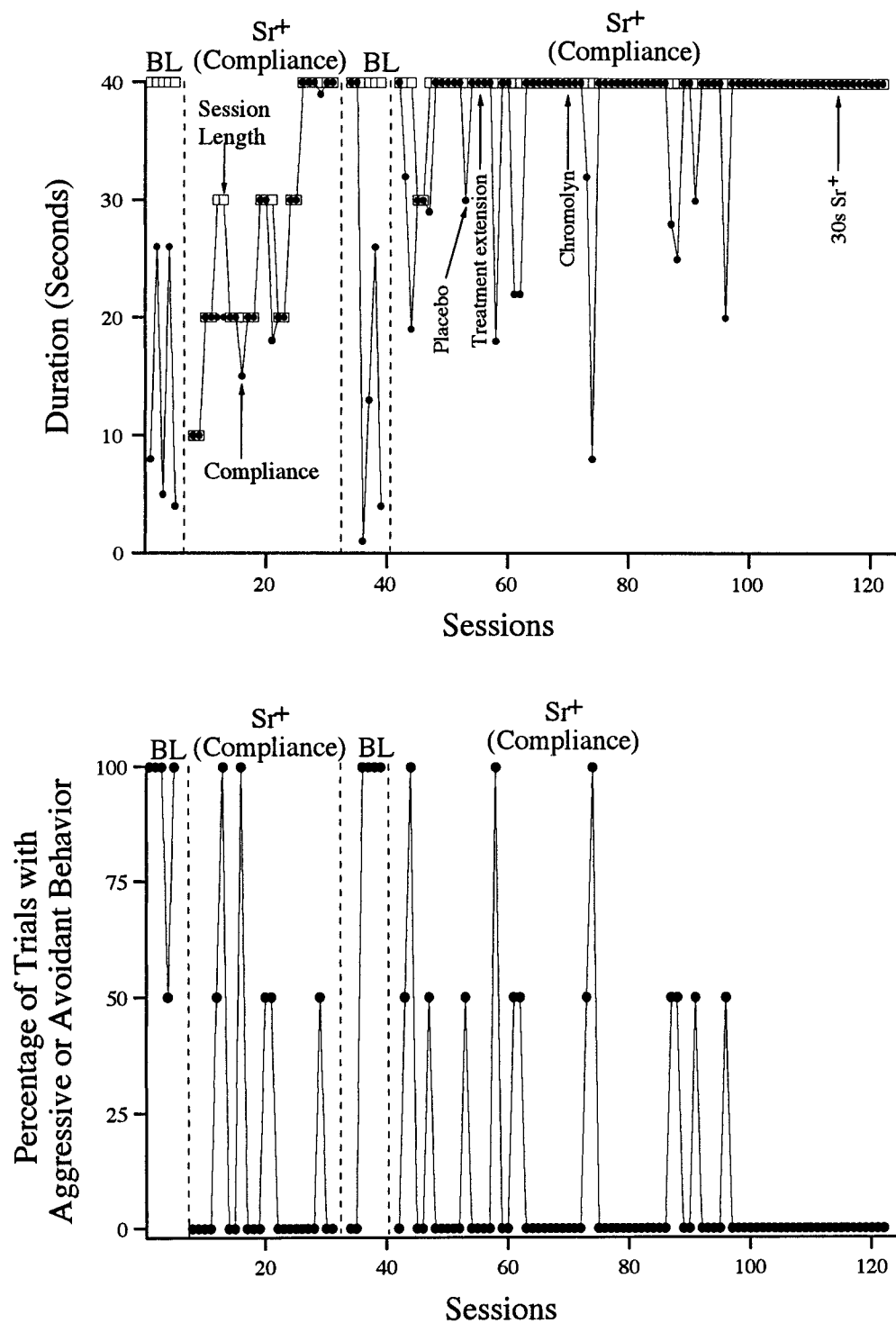


Figure 1. The top panel shows the duration of compliance with respiratory treatment and the programmed duration of administration (session length). The bottom panel shows the percentage of trials with aggression or avoidance behavior.

final treatment phase, the mean duration of compliance was 37.2 s (40 s in the final 26 sessions). During the 14 weeks after discharge, Cal's level of compliance with his respiratory treatment averaged 97.7%.

In the current investigation, the reinforcement of compliance resulted in increased cooperation with respiratory treatment for CF. A functional analysis indicated that Cal's problem behaviors were maintained by escape (from dressing and hygiene tasks) as well as by attention. Based on these results, it seems likely that his aggression and avoidance behavior during respiratory treatments were probably also maintained by escape. However, this interpretation remains speculative because demands related to respiratory treatment were not presented during functional analysis; therefore, the function of these behaviors was not directly assessed, and it is possible that attention was the maintaining reinforcer. Although escape from the procedure was the reinforcer hypothesized to maintain Cal's aggression and avoidance behavior during inhalation treatments, escape extinction was not included as a treatment component. Cal's caregivers were unable to administer the inhalation treatment when he became extremely aggressive or struggled to avoid the procedure, and would have been unable to implement escape extinction under these conditions.

Two factors may have contributed to the success of this treatment. First, the amount

of time that Cal was required to wear the mask was initially small, thus increasing the likelihood that he would contact reinforcement at the outset of treatment. Second, although Cal could continue to escape the respiratory treatments with problematic behavior, these behaviors resulted in the loss of an opportunity to obtain access to his reinforcers during the 1-min intertrial interval. These results suggest that, in some cases, compliance can be increased by using reinforcement procedures even when problem behavior continues to produce escape.

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*Received July 10, 1998*

*Initial editorial decision September 8, 1998*

*Final acceptance January 31, 1999*

*Action Editor, Brian A. Iwata*